

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**ATOMIC SAFETY AND LICENSING BOARD  
Before Administrative Judges:**

**09-892-HLW-CAB04  
Thomas S. Moore, Chairman  
Paul S. Ryerson  
Richard E. Wardwell**

In the Matter of:	)	December 7, 2009
	)	
U.S. Department of Energy	)	
	)	Docket No. 63-001
(High Level Waste Repository	)	
Construction Authorization Application)	)	
	)	

**U.S. DEPARTMENT OF ENERGY BRIEF ON  
CONTENTION NEV-SAFETY-041**

**I. Introduction**

In their May 11, 2009 “Memorandum and Order (Identifying Participants and Admitted Contentions),” Construction Authorization Boards (CABs) 01, 02 and 03 admitted for hearing Nevada Safety Contention 041, relating to the treatment of erosion in the U.S. Department of Energy’s (DOE or Department) Total System Performance Assessment (TSPA).<sup>1</sup> The CABs also identified NEV-SAFETY-041 as a “legal” contention to be briefed.<sup>2</sup>

In response to the September 30, 2009 Case Management Order #2 (issued by CAB 04), DOE and the State of Nevada agreed to brief the following legal issue:

Whether 10 C.F.R. § 63.342(c) requires the post-10,000 year performance assessment to include the continued effects of erosion if, assuming for purposes of legal argument, in the 10,000-year

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<sup>1</sup> See *U.S. Dep’t of Energy* (High Level Waste Repository), LBP-09-06, 69 NRC \_\_ (slip op. at 127) (May 11, 2009).

<sup>2</sup> *Id.*

assessment erosion is shown to increase infiltration and seepage rates and thereby be potentially adverse to performance, with that potential increasing over time both before and after 10,000 years, but there is no showing that erosion causes increases in radiological exposures or releases within the first 10,000 years.<sup>3</sup>

On October 23, 2009, CAB 04 issued its “Order (Identifying Phase 1 Legal Issues for Briefing)” approving this formulation of the legal issue to be briefed.<sup>4</sup> As discussed below, § 63.342(c) does not require the post-10,000 year performance assessment to include the effects of erosion in the circumstances stated in this legal issue.

## II. Argument

### A. *The Explicit Language of The Regulations Does Not Require Erosion to be Included in the Post-10,000 Year Performance Assessment Under the Assumptions Set Forth in the Legal Issue*

The agreed-upon legal issue requires the parties to “assum[e] for purposes of legal argument” that erosion will in fact increase infiltration and seepage rates and thereby be potentially “adverse to performance” during and beyond the first 10,000 year period. The agreed-upon legal issue also explicitly requires the parties to assume that there is “no showing [of resulting] increases in radiological exposures or releases within the first 10,000-years.”<sup>5</sup>

10 C.F.R. § 63.342(c) requires, as a general matter, that if features, events or processes (FEPs) are included in the performance assessment for the first 10,000 year post-disposal period, then DOE “shall project the continued effects” of those FEPs “beyond the 10,000-year post disposal period through the period of geologic stability . . . .”<sup>6</sup> To be required to include and

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<sup>3</sup> U.S. Dep’t of Energy, State of Nevada and Nuclear Energy Institute Joint Proposal Identifying Phase 1 Legal Issues for Briefing, Attachment 1 at 3 (Oct. 6, 2009).

<sup>4</sup> CAB 04, Order (Identifying Phase 1 Legal Issues for Briefing) (Oct. 23, 2009) (unpublished).

<sup>5</sup> *Id.*

<sup>6</sup> Nevada’s contention references a number of other regulations. DOE and Nevada agreed that, while either

extend the analysis of the erosion FEP into the *post*-10,000 year period under 10 C.F.R.

§ 63.342(c), that regulation explicitly states that DOE must have been required to “include[]” the FEP in the performance assessment for the *first* 10,000 years pursuant to 10 C.F.R. § 63.342(a).<sup>7</sup>

10 C.F.R. § 63.342(a), in turn, limits the scope of evaluations within the first 10,000 years as follows:

DOE’s performance assessment need not evaluate the impacts resulting from any [FEPs] or sequences of events and processes ... if the *results* of the performance assessments would not be changed *significantly* in the initial 10,000-year period after disposal.<sup>8</sup>

Emphasis added.

Since it is clear from the regulation that, if the FEP was properly excluded in the first 10,000 year period, DOE need not include the FEP in the post-10,000 year period, if the FEP was excluded in the first 10,000 year period, the legal question before the Board turns on the meaning of 10 C.F.R. § 63.342(a), which permits DOE to exclude FEPs in the first 10,000 years, where the “results” of the performance assessment “would not be changed significantly” in the first 10,000 years.<sup>9</sup> As discussed below, simply increasing infiltration or seepage rates to some degree in a manner which could potentially be “adverse to performance” does not, by itself, constitute a “significant” change in the performance assessment “results.”

To establish what constitutes such a “significant” change in the performance assessment

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party is free to discuss those or other regulations in their brief, the legal issue to be decided focuses exclusively on what is required to comply with Implementation of a Dose Standard After 10,000 Years, 74 Fed. Reg. 10,811, 10,829 (Mar. 13, 2009) (to be codified at 10 C.F.R. § 63.342(c)).

<sup>7</sup> Section 63.342(c) also contains additional provisions regarding consideration of seismic and igneous events, climate change, and general corrosion of engineered barriers that are not relevant to this legal issue. *See* 74 Fed. Reg. at 10,829.

<sup>8</sup> 74 Fed. Reg. at 10,829 (to be codified at 10 C.F.R. 63.342(a)) (emphasis added).

<sup>9</sup> *Id.* at 10,829.

“results,” it is necessary to consider 10 C.F.R. § 63.114, “Requirements for performance assessments,” which sets forth requirements for the consideration of FEPs. Specifically, 10 C.F.R. § 63.114 states in pertinent part:

Specific [FEPs] must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, for 10,000 years after disposal, would be significantly changed by their omission.<sup>10</sup>

Thus, a FEP may be excluded (*i.e.* not “evaluated in detail”) unless doing so will result in a “significant” change in the “magnitude and time” of radiological exposures to the reasonably maximally exposed individual (RMEI) or of radiological releases to the accessible environment during the first 10,000 years after repository closure. Notably, the requirement for FEP evaluation in § 63.114, like that in § 63.342(a), is not based upon postulated changes in inputs or intermediate outcomes (e.g., infiltration or seepage rates), but rather only upon a significant change in projected doses or radiological releases (*i.e.*, in the *results* of the performance assessment).

The performance assessment is intended to “demonstrate compliance with § 63.113 for 10,000 years after disposal.”<sup>11</sup> Section 63.113 sets performance objectives based on: (1) dose to the RMEI (§ 63.113(b)); (2) radiological releases to the accessible environment (§ 63.113(c)); and (3) dose based on human intrusion (§ 63.113(d)).<sup>12</sup> These performance objectives are the benchmarks for performance assessment “results” that NRC intends DOE to use for purposes of determining FEP inclusion or exclusion. Doses and releases are the ultimate results of the

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<sup>10</sup> 10 C.F.R. § 63.114(e).

<sup>11</sup> *Id.* § 63.114(a).

<sup>12</sup> 10 C.F.R. § 63.113.

analysis. Intermediate or ancillary changes in input parameters or outcomes (such as infiltration or seepage rates) are not *results* within the meaning of the regulation.

This logic is confirmed by the definition of “performance assessment” in 10 C.F.R.

§ 63.2. A Performance Assessment is an analysis that:

- (1) Identifies the features, events, processes . . . and sequences of events and processes . . . that might affect the Yucca Mountain disposal system and their probabilities of occurring;
- (2) Examines the effects of those features, events, processes, and sequences of events and processes upon the performance of the Yucca Mountain disposal system; and
- (3) *Estimates the dose incurred by the reasonably maximally exposed individual, including the associated uncertainties, as a result of releases cause by all significant features, events, processes, and sequences of events and processes, weights by their probability of occurrence.*<sup>13</sup>

It is clear, therefore, that the ultimate “result” of a performance assessment is an estimate of the radiological dose incurred by the RMEI after considering the effect of the appropriately screened-in FEPs on the repository’s performance.<sup>14</sup> Thus, the need to evaluate changes to inputs (in this case, increases in infiltration and seepage rates) arises when those changes are such that they would “significantly” affect the “result” of the performance assessment, *i.e.*, the estimated dose incurred by the RMEI, radiological releases to the environment, or dose based on human intrusion, within the initial 10,000-year time period.

***B. The Relevant Regulatory History Supports DOE’s Interpretation***

This interpretation is confirmed by the regulatory history of 40 C.F.R. Part 197, promulgated by the Environmental Protection Agency (EPA) pursuant to its responsibility under

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<sup>13</sup> *Id.* § 63.2 (emphasis added).

<sup>14</sup> *See id.*

the Nuclear Waste Policy Act (NWPA) for issuing “applicable standards for protection of the general environment from offsite releases from radioactive material in repositories.”<sup>15</sup>

In the Public Comments and Responses section of the 2008 modification of the Final Rule for Part 197, the EPA characterized the FEP evaluation process as follows: “[o]nce FEPs are identified, they are evaluated for their probability of occurrence . . . and their effect on the *results* of the performance assessment (*i.e., do they significantly affect the projected doses from the disposal system during the first 10,000 years after disposal*).”<sup>16</sup> Thus, according to the EPA, the “results” of the performance assessment are “the projected doses from the disposal system . . .” EPA further elaborated on the logic underlying its restriction of the requirement for detailed evaluation of FEPs to those that have a significant effect on the results of performance assessments in its Part 197 Final Rule notice:

As an initial step, a wide-ranging set of FEPs that potentially could affect the disposal system performance is identified. The term “potentially” is key here, because at this early stage, the list is deliberately broad, focusing more on “what could happen” rather than “what is likely to happen at Yucca Mountain.” [E]ach of these FEPs is then examined to determine whether it should be included in an assessment of disposal system performance over a 10,000-year period by evaluating the probability of occurrence at Yucca Mountain and, as appropriate, the effects of the FEP on the results of the performance assessment.<sup>17</sup>

EPA then set out the critical second criterion for evaluating FEPs: “*the significance of the impacts on performance assessment*, [which] allows FEPs above the probability threshold to be

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<sup>15</sup> 42 U.S.C. § 10141(a).

<sup>16</sup> Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada, 73 Fed. Reg. 61,256, 61,279 (Oct. 15, 2008) (emphasis added).

<sup>17</sup> *Id.*

excluded from the analyses if they would not significantly change the results of performance assessments.”<sup>18</sup>

The agreed-upon statement of the legal issue postulates that there is no change whatsoever in radiological releases or doses attributable to erosion in the initial 10,000 years after disposal. By contrast, the requirements in § 63.114 for inclusion of FEPs in performance assessments are directed specifically and solely to those producing “significant changes” in releases or doses within the first 10,000 years after disposal. Similarly, the requirement in § 63.342(a) for evaluation of FEPs that cannot be excluded on the basis of low probability of occurrence pertains only to those whose exclusion would result in a “significant change” to a performance assessment. If, as is assumed by the legal issue being briefed, there is no showing that erosion causes increases in radiological exposures or releases within the first 10,000 years, then clearly there are no “significant changes” in “results” from erosion during the 10,000 year period. There is thus no requirement for evaluation of erosion as a FEP. This remains true even if, as the statement of the legal issue postulates, there may be “increases in infiltration and seepage rates [that are] potentially adverse to performance, with the potential increasing over time both before and after 10,000 years.”

The requirement for evaluation of FEPs beyond 10,000 years in § 63.342(c) hinges on a requirement for evaluation under § 63.342(a). Since, as shown above, there is no requirement for evaluation of erosion under § 63.342(a), because there is no showing that it causes any increases in radiological exposures or releases within the first 10,000 years, there is none under § 63.342(c). For these reasons, the legal issue before the Board must be resolved in DOE’s favor.

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<sup>18</sup> *Id.* at 61,282.

Therefore, the remaining factual issue to be adjudicated under this contention is whether:

DOE's exclusion of land surface erosion (FEP 1.2.07.01.0A), as reflected in SAR Subsections 2.2.1.1 and 2.2.1.2 and similar subsections, is incorrect because modeling studies and actual observations demonstrate that erosion will significantly affect the magnitude and time of resulting radiological exposures or radionuclide releases to the accessible environment within the first 10,000 years after disposal.

III. **Conclusion**

In conclusion, § 63.342(c) does not require DOE to include the effects of erosion in the post-10,000 year performance assessment under the circumstances set forth in the agreed-upon legal issue. Thus, the remaining factual issue to be adjudicated is limited as set forth above.

Respectfully submitted,

*Signed electronically by Donald J. Silverman*

Donald J. Silverman  
Counsel for the U.S. Department of Energy  
Morgan, Lewis & Bockius LLP  
1111 Pennsylvania Avenue, N.W.  
Washington, DC 20004

James Bennett McRae  
Martha S. Crosland  
U.S. Department of Energy  
Office of the General Counsel  
1000 Independence Avenue, SW  
Washington, DC 20585

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